Vitamin C / COVID-19 Notes

Vitamin C /COVID-19 Notes
by Anthony of Boston

Vitamin C as a standalone nutrient may slightly advance the early stages of influenza and coronavirus infection. Vitamin C has a very similar molecular structure to glucose(sugar) and this leaves the possibility that both high vitamin C levels and high glucose levels provide the ideal conditions for COVID-19 to attack the lung's immune defense system and gain access to alveolar cells before binding to the human ACE2 receptor. Research has shown that high glucose levels enable the virus to enter the pulmonary cells and replicate rapidly, inducing a pulmonary response. This response is caused by the immune system sending immune cells to the site in order to combat the threat. Cytokines are produced as part of the response. These cytokines are responsible for cell to cell communications and if too many are produced, the result is what's called cytokine storm. This can lead to pneumonia and organ failure. A study involving analysis of blood samples drawn from 119 influenza patients at two hospitals in Wuhan, China found that those patients with higher glucose levels were more likely to undergo a cytokine storm. Their findings affirmed why patients with diabetes are more likely to experience cytokine storms and have worse outcomes with influenza and coronavirus infections.

A case study at the annual meeting of the Endocrine Society (ENDO), from March 17–20 presented an example of a false high blood glucose reading as a result of high Vitamin C intake. The Glucometer device used to measure blood glucose could not distinguish glucose from Vitamin C. This resulted in a false high blood glucose reading. However, a blood test showed that his glucose levels were significantly lower. I hypothesize that the same is happening with influenza and coronavirus. When entering the body, the virus does not see the difference between vitamin C or glucose and benefits from the presence of either. Vitamin C and glucose have the same molecular structure and this is also apparent to the virus. Numerous

studies have shown that Vitamin C does nothing to prevent or treat flu or colds. I hypothesize that Vitamin C as a standalone measure may exacerbate symptoms and can have an antagonizing effect on nutrients that could subvert the influenza or coronaviruses. This may be why that even though Vitamin C is common consensus as something that can fight flu symptoms, it still does not avert the number of cases every year.

Personally, I found Vitamin C to be most beneficial in alleviating liver/loss of appetite issues. I found Magnesium Oxide to be most beneficial for alleviating nausea/vomiting issues. I found Vitamin E(dl-Alpha tocopherol) to be most beneficial for alleviating early flu/cold symptoms like fatigue.

I found glucose/Vitamin C to increase susceptibility to flu/cold symptoms. I found Vitamin E to increase susceptibility to nausea/ vomiting issues. I found Magnesium Oxide to increase susceptibility to loss of appetite issues.

For Heart/ High Cholesterol/ High blood pressure issues, I found Magnesium Oxide and Vitamin C combined to be most beneficial.

Some nutrients may decrease oxidative stress in some organs, but may also increase it in other organs.

Many people have reported success in using Vitamin C to treat flu symptoms. In many of these cases, Vitamin C was taken with other nutrient vitamins like vitamin D and Zinc, both of which may have had a more significant role in reducing initial flu symptoms than Vitamin C. It is possible that Vitamin C could have inhibited the standalone effects of Zinc and other vitamin/minerals used in various studies. I hypothesize that the key component in combating early flu or coronavirus manifestations is upregulating the expression of the Glut-1 transporter protein. This happens by lowering circulating blood glucose and vitamin C levels in the body. Both Vitamin C

and glucose enter the cells using the Glut-1 receptor and as long as both Vitamin C and glucose remain circulating in the bloodstream at high levels, Glut-1's expression will remain downregulated.

According to studies, high circulating blood glucose(hyperglycemia) and high circulating Vitamin C can downregulate the expression of Glut-1. Low circulating blood glucose(hypoglycemia) and low circulating Vitamin C can upregulate the expression of Glut-1. (*Hydroxychloroquine may be the best at inducing the lower glucose environment needed for Glut-1 upregulation.*)

COVID 19 has been found to downregulate the expression of Glut 1. Monocytes and macrophages are enriched immune cell types in the lungs of COVID-19 patients. When infected by influenza or coronavirus, these cells adapt their metabolism and become highly glycolytic. The cells began to convert glucose into energy at a high rate. This helps facilitate viral replication. Virus replication thus becomes dependent on circulating blood glucose and vitamin C and the corresponding downregluation of Glut-1 expression.

It is certainly observable that Vitamin C may help alleviate the after-effects of mechanisms involved in the immune response. It can certainly help the liver recover from extended influenza or coronavirus treatment.

Information about Vitamin C and downregulation of Glut-1 can be found here:

Vitamin C uncouples the Warburg metabolic switch in KRAS mutant colon cancer

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García-Foncillas

“Vitamin C induces RAS detachment from the cell membrane inhibiting ERK ½ and PKM2 phosphorylation. As a consequence of this activity, <u>strong downregulation of the glucose transporter (GLUT-1)</u> and pyruvate kinase M2 (PKM2)-PTB dependent protein expression are observed causing a major blockage of the Warburg effect and therefore energetic stress.”

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Bibliography

https://www.thno.org/v11p3595.htm (Vitamin C downregulates expression of Glut-1)

https://journals.physiology.org/doi/pdf/10.1152/ajpcell.00140.2010

https://blog.livonlabs.com/vitamins-and-nutrients/sugar-vitamin-c-intake/

https://pubmed.ncbi.nlm.nih.gov/7589845/

https://onlinelibrary.wiley.com/doi/full/10.1002/ehf2.13063

https://www.news-medical.net/news/20210503/Evidence-that-elevated-blood-glucose-is-a-significant-risk-factor-for-severe-COVID-19.aspx

https://www.practiceupdate.com/content/endo-2018-intravenous-high-dose-vitamin-c-can-interfere-with-blood-glucose-monitoring/65990

https://www.oxylent.com/negative-impact-sugar-vitamin-c-supplements/

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